Analysis of Brownfields Cleanup Alternatives Preliminary Evaluation

Hillcrest Site
2200 Larpenteur Avenue East
St. Paul, Minnesota

Prepared for

Saint Paul Port Authority

Project B1903316.00
September 1, 2022

Braun Intertec Corporation

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Analysis of Brownfields Cleanup Alternatives
Preliminary Evaluation
Prepared for: Saint Paul Port Authority

Hillcrest Site - 2200 Larpenteur Avenue East, Saint Paul, Minnesota

I. INTRODUCTION & BACKGROUND INFORMATION

a. Introduction

This document provides an analysis of brownfields cleanup alternatives (ABCA) for the Former Hillcrest Golf Course Site in St. Paul, Minnesota (herein referred to as "the Hillcrest Site"). This section of the ABCA includes information on the location of the Hillcrest Site, previous site uses, descriptions of previous assessment and remediation activities that have occurred, and planned reuse/redevelopment.

b. Site Location

The Former Hillcrest Golf Course Site is located at the southwest quadrant of McKnight Road North and Larpenteur Avenue East in northeast St. Paul, Minnesota. The most recent street address of the Hillcrest Site was 2200 Larpenteur Avenue East. A diagram depicting the Hillcrest Site is included as **Attachment 1**.

b.1 Site Description

The Hillcrest Site is approximately 112-acres in size and was acquired by the Saint Paul Port Authority (SPPA) in June 2019 with the goal of facilitating completion of a mixed-use redevelopment that includes a combination of residential, commercial, job center (i.e., light industrial), and green space uses. The Hillcrest Site has undergone a formal planning process through the City of St. Paul which has determined, with community input, a redevelopment configuration and land use plan consistent with City's requirements/goals. The City Council approved the Master Plan on June 1, 2022.

Environmental studies completed on behalf of the SPPA identified widespread soil contamination at the Hillcrest Site that will require cleanup/remediation prior to (or concurrent with) redevelopment. A Site Diagram is included as **Attachment 2**.

b.2 Climate Condition Factors

According to published geologic information, the depth to groundwater at the Hillcrest Site is approximately 100 to 200 feet below land surface (bls) and the regional groundwater flow direction is generally to the west-southwest. Shallow, most likely perched, groundwater was encountered intermittently during previous environmental and geotechnical investigations at the Hillcrest Site at depths between approximately 4.5 and 15 feet bls.

The United States Environmental Protection Agency (USEPA) website for Climate Impacts for the Midwest (USEPA Web site: https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-midwest.html) was accessed to identify possible climate-related factors that either currently (or will in the future) impact the Hillcrest Site. The Hillcrest Site is currently affected by extremely cold air masses from the north and warm, humid air masses from the south. Typical of Minnesota and the Midwest, the Hillcrest Site experiences wide temperature fluctuations and precipitation extremes. Regional average temperatures impacting the Site have increased over the last several decades. Temperatures in St. Paul, Minnesota are projected to continue to increase as a result of climate change. The St. Paul area (including the Hillcrest Site) is expected to experience warmer and wetter winters, heavy precipitation in the spring months, and hotter, drier summers.

Many other typical major climatic risk factors do not apply to the Hillcrest Site based on physiographic location. For example, St. Paul, Minnesota is not located near an ocean or large inland lake and will not be directly affected by changes in the water level elevations in coastal oceans or large inland lakes. Rather, the Hillcrest Site is located within an existing municipal area that includes existing residential and commercial uses. Based on the location of the Hillcrest Site and its proposed redevelopment, it is unlikely that future changes in temperature, changes in dates of ground thaw/freeze, changing ecological zones, and/or other climatic changes will significantly affect future property use and/or remediation/cleanup planning. However, the SPPA is committed to redeveloping the Hillcrest Site in a responsible manner that promotes sustainability and minimizes impacts of the future redevelopment to the environment.

c. Previous Site Uses and Previous Cleanup/Remediation

Prior to the 1920s the Hillcrest Site was cultivated agricultural land or grazing land. The Hillcrest Golf Course was developed in the 1920s as a full size 18-hole private golf course/club that included clubhouse facilities, a swimming pool with pool building, driving range, practice putting greens, tennis courts, and various support buildings that included general storage buildings and a maintenance shop on the north side of the Hillcrest Site, and agricultural chemical storage buildings on the southeastern side. Earthen berms, which contain intermixed debris, are located along the southeastern boundary of the Hillcrest Site next to and south of the agricultural chemical storage buildings and two unsealed water wells. The Hillcrest Site has been vacant and unused since the former Golf course ceased operations in 2017.

During use as a golf course, various petroleum products were used and stored on the Hillcrest Site. Specifically, three past petroleum releases have been reported at the Site, Leak ID# 5050; Leak ID# 6222; and Leak ID# 18327. All three petroleum release leak sites were closed by the MPCA following site investigations, or in the case of Leak ID #6222, review of the limited soil cleanup actions taken following tank removal (i.e., excavation, hauling and treatment of an estimated 180 tons of petroleum-impacted soil).

d. Site Assessment Findings

Prior to property acquisition in June 2019, the SPPA retained Braun Intertec Corporation to complete a Phase I Environmental Site Assessment (ESA) of the Hillcrest Site in accordance with ASTM Standard Practice E1527-13. The Phase I ESA results were documented in a report dated June 10, 2019. In summary, the Phase I ESA identified the following recognized environmental conditions (RECs) related to Hillcrest Site: 1) the presence of remaining contamination from past petroleum tank leaks, 2) the potential for agricultural chemical releases to the soil and groundwater, 3) the potential that repeated historical application of fungicide at the Site resulted in an accumulation of mercury in the soils over time, and 4) the potential presence of contaminated soils and buried regulated waste materials in berms present at various locations.

Prior to site acquisition, Braun Intertec was retained to complete a Preliminary Phase II ESA to evaluate whether the soil, soil vapor, and/or groundwater beneath the Hillcrest Site was impacted at levels requiring remediation. The Limited Phase II ESA results were documented in a report dated June 10, 2019. The Preliminary Phase II ESA identified both non-petroleum and petroleum compounds in soil at various locations and depths across the Hillcrest Site. The non-petroleum impacts included widespread mercury contamination from the historical use of specialty fungicides and other turf management agricultural products associated with golf courses from the 1930's to the 1990's. Mercury concentrations as high as 144 milligrams per kilogram (mg/kg) were detected in soil samples collected from areas near the former golf course greens/fringes. The majority of the shallow soil samples collected from the former golf course tee boxes and fairways at the 0 to 6-inch depth interval contained mercury at concentrations exceeding the MPCA's residential and commercial soil reference values (SRVs), in effect at that time of the investigation, of 0.5 mg/kg and 1.5 mg/kg, respectively. The mercury concentrations in soil were found to decrease with depth and were generally below MPCA SRVs in soil samples collected at depths starting at a depth of approximately 1-foot (or less) in former tee box/fairway areas. Below the former golf course greens, the mercury concentrations in soil were generally below SRVs at depths starting at approximately 2-feet.

Additional non-petroleum impacts to soil from polycyclic aromatic hydrocarbons (PAHs) and arsenic were also detected at a few locations at the Hillcrest Site, but these impacts are relatively minor in extent and magnitude. Petroleum impacts detected at the Hillcrest Site were limited to the area of the three "closed" petroleum leak sites that were discussed previously in Section I.c of this ABCA.

Groundwater samples collected during the Preliminary Phase II ESA did not detect evidence of significant or widespread contamination by petroleum compounds or hazardous substances. The only detection of a contaminant in groundwater above a drinking water standard was diesel range organics (DRO) in the sample collected near the previously investigated and closed petroleum leak sites.

Low concentrations of volatile organic compounds (VOCs) were detected in soil vapor samples collected during this investigation. However, no VOCs in the soil vapor were detected at concentrations above the MPCAs action levels requiring mitigation during site redevelopment.

The Limited Phase II ESA report concluded that additional environmental investigation(s) would be needed to further delineate and define the magnitude and extent of the identified impacts at the Hillcrest Site in consideration of future redevelopment.

Based upon the results of the Limited Phase II ESA, Braun Intertec Corporation received authorization from Mr. Monte Hilleman of the Saint Paul Port Authority to complete a Remedial Environmental Investigation of the Site. Information from the Limited Phase II ESA was used to prepare a Remedial Investigation Work Plan. The goal of the Remedial Environmental Investigation was to define and delineate the magnitude and extent of contaminant impacts across the Site.

The Remedial Investigation Work Plan dated March 27, 2020 (The RI Work Plan) and RI Work Plan Addendum dated June 12, 2020 were submitted to the Minnesota Department of Agriculture (MDA) for review and approval. The RI Work Plan was approved by the MDA Incident Response Staff on May 5, 2020, and the RI Work Plan Addendum was approved by email on June 23, 2020. On October 7, 2021, RI Work Plan Addendum #2 (RI Work Plan Addendum #2) was submitted to the MDA from review. The MDA approved RI Work Plan Addendum #2 on November 2, 2021.

The site investigation was partially funded from a U.S. Environmental Protection Agency (EPA) Assessment Grant (BF00E02723). As such, all field work and sampling procedures were conducted in accordance with the Quality Assurance Project Plan (QAPP), Revision 0, dated September 26, 2019, that was previously submitted to and approved by EPA Region 5. As required under the QAPP, a Sampling and Analysis Plan (SAP) document containing the same elements of the RI Work Plan was prepared by Braun Intertec. The SAP, dated May 11, 2020, was submitted to the U.S. EPA Region 5.

The Remedial Environmental Investigation was performed between June and August 2020 in accordance with the RI Work Plan and RI Work Plan Addendum, with additional investigation performed in November 2021 in accordance with RI Work Plan Addendum #2. A comprehensive Remedial Environmental Investigation report was prepared dated March 1, 2022. The Remedial Environmental Investigation results were similar to the Preliminary Phase II ESA, with both non-petroleum and petroleum compounds detected in soil at various locations and depths across the Hillcrest Site. The Remedial Environmental Investigation defined the extent of mercury, showing that mercury impacts are present throughout the greens/fringes and tee boxes, as well as intermittent mercury impacts around the maintenance/chemical storage and mixing areas, in the fairways, and in sediments in some wetland/drainage accumulation areas, including the large wetland located adjacent to the maintenance area near the southeast corner of the Site. In addition, the Remedial Environmental Investigation identified PAHs and metals impacts associated with areas of buried debris near the former pool house and in a berm located on the southern portion of the site adjacent to the former maintenance areas. Additional mercury impacts were also identified in isolated areas near the clubhouse. Using the data collected to date, the extent of identified impacts are shown on a Contaminant Locations Map included as **Attachment 3**.

e. Overall Project Goal

The SPPA acquired the Hillcrest Site in June 2019 with the goal of facilitating completion of a mixed-use redevelopment that includes a combination of residential, commercial, job center (i.e., light industrial), and green space uses. The Hillcrest Site is currently undergoing a formal planning process through the City of St. Paul with community input, which will determine a redevelopment configuration and land use plan consistent with City's requirements/goals. Future activities to be conducted by the SPPA to facilitate redevelopment will likely include demolishing existing site structures, implementing site grading necessary to support the final agreed upon development plan, and constructing roadways, public utilities, and related storm water infrastructure to support the planned development.

A diagram depicting the planned redevelopment configuration developed as part of the City of St. Paul's master planning and community engagement process is included in **Attachment 4**.

II. APPLICABLE REGULATIONS AND CLEANUP STANDARDS

a. Cleanup Oversight Responsibility

The Saint Paul Port Authority will hire a qualified environmental professional services company to oversee and document the cleanup/remediation of the Hillcrest Site and will comply with the procurement provisions of 40 CFR Part 31.36.

The SPPA has entered the Hillcrest Site in the MDA Agricultural Chemical Voluntary Investigation and Cleanup (AgVIC) Program, MPCA Voluntary Investigation and Cleanup (VIC) Program, and the MPCA Petroleum Brownfields (PB) Program to facilitate investigation and cleanup of the property and to receive applicable assurance letters from these agencies. MDA involvement on this project is triggered by the mercury impacts related to the historic use of mercury-containing fungicides used for turf management. Specifically, the MDA has jurisdiction for all impacts resulting from use of hazardous substances for agricultural purposes including turf management on golf courses. Agency approvals and environmental assurances will be sought through the MDA for agricultural chemical impacts at the property. The MPCA VIC Program's involvement is needed to obtain environmental assurances and approvals related to hazardous substances for which they have jurisdiction (e.g., PAHs), and the MPCA PB Program's involvement is needed to obtain environmental assurances and approvals related to the past petroleum releases and remaining residual petroleum contamination.

b. Cleanup Standards for Major Contaminants

The soil cleanup standards for the Hillcrest Site will be based on the MPCA residential Soil Reference Values (SRVs) for areas targeted for residential and recreational uses and commercial/industrial SRVs for areas targeted for commercial/industrial development. For mercury, the primary contaminant driving clean up at the Hillcrest Site, the current residential/recreational SRV and commercial/industrial SRV are 2.7 mg/kg and 3.1 mg/kg, respectively.

Other applicable cleanup standards include:

- Soil Impacted by Hazardous Substances (other than mercury):

  Soil cleanup standards for non-agricultural based hazardous substances will also be based on MPCA residential and commercial/industrial SRVs, as appropriate, and on guidance documents prepared by the MPCA VIC Program.

- Soil Impacted by Petroleum:
  Soil cleanup standards for petroleum will be based on MPCA petroleum guidance documents prepared by the MPCA PB Program. In summary, the MPCA cleanup standards for petroleum-impacted soil on redevelopment sites are based field screening using a photoionization detector (PID). Excavated petroleum-impacted soil with PID readings greater than 200 ppm typically requires segregation and off-site disposal at a permitted landfill. Excavated petroleum-impacted soil that with PID readings between 10 and 200 ppm may be reused onsite as restricted fill (e.g., below paved surfaces) subject to MPCA review and approval.

- Soil Impacted by Fertilizers/Herbicides/Pesticides:
  Soil cleanup standards for releases related to past uses of fertilizers, herbicides and pesticides will be based on applicable MPCA residential and industrial SRVs and MDA agricultural chemical release guidance documents utilized by the MDA AgVIC Program.

- Soil Vapor Impacts:
  MPCA criteria for vapor mitigation is based on the analytical results of soil vapor samples collected in areas of proposed buildings. Specifically, vapor mitigation is required if one or more individual VOCs are detected at a concentration greater than 33 times an established MPCA Intrusion Screening Value (ISV) for Residential or Commercial / Industrial building use categories, as appropriate.

c. Laws & Regulations Applicable to the Cleanup

Laws and regulations that are applicable to this cleanup include the following Comprehensive Response, Compensation and Liability Act (CERCLA), including the Brownfields Revitalization Act, Minnesota Environmental Response and Liability Act (MERLA), the Federal Davis-Bacon Act, Petroleum Tank Release Cleanup Act, and other applicable State of Minnesota environmental laws, and local City by-laws and ordinances. Federal, State, and local laws regarding procurement of contractors to conduct the cleanup will be followed. Applicable guidelines utilized by the MDA AgVIC Program, MPCA VIC Program and MPCA PB Program will also be utilized and followed as appropriate.

III. CLEANUP ALTERNATIVES

a. Cleanup Alternatives Considered

The widespread soil contamination identified at the Hillcrest Site is the primary technical factor driving the need for environmental cleanup/remediation. For purposes of this ABCA, the following four technical alternatives were considered to address the known soil contamination at the Hillcrest Site:

- Alternative #1: No Action
- Alternative #2: Phytoremediation
- Alternative #3: Contaminated Soil Excavation with Offsite Disposal
- Alternative #4: Contaminated Soil Excavation with a combination of On-Site Soil Management and Off-Site Disposal.

Based on the assessment findings to date, cleanup/remediation actions related to groundwater or soil vapors at the Hillcrest Site are not needed, and thus are not addressed further in this ABCA document.

b. Evaluation of Cleanup Alternatives

The four remedial alternatives were evaluated to determine if they could achieve the SPPA's overall project goal of facilitating redevelopment and minimizing risks to human health and the environment. The alternatives deemed capable of achieving the overall project goal were further evaluated for effectiveness, implementability, and cost.

Alternative #1 (No Action) was determined to be inconsistent with the SPPA's overall project goal of facilitating future redevelopment and minimizing risks to human health and the environment. This alternative would consist of controlling site access through physical means (i.e., perimeter fence) and placing a restrictive covenant or other appropriate institutional controls on the property deed. Since no soil cleanup/ remediation would occur under this alternative, soil contamination would remain in place near the ground surface. This would prevent development and reuse of the property. Based on these factors, Alternative #1 (No Action) was eliminated from consideration and was not evaluated further for effectiveness, implementability, and cost.

Alternative #2 (Phytoremediation) involves the use of plants to remove pollutants from the environment in-situ (i.e., in place). For inorganic contaminants like mercury, it works by plants (and their roots) absorbing the contaminant from the soil and storing it in the stems and leaves of the plant. In the right circumstances and timeframes, phytoremediation has been used effectively for remediation of metals contaminated sites. However, Alternative #2 (Phytoremediation) was also removed from further consideration and was not evaluated further for effectiveness, implementability, and cost for the Hillcrest Site due to the following factors:

1) Long Implementation Timeframe. Phytoremediation can take a very long time to treat contaminated soils and meet established cleanup standards. The time required to remediate a site by phytoremediation usually takes significantly longer than traditional

excavation-based methods. This is particularly true on sites with high containment concentrations and low cleanup standards, such as the mercury-impacted soils at the Hillcrest Site. In our opinion, phytoremediation at the Hillcrest Site would require implementation over many years and across many plant growth/harvesting cycles before site cleanup standards are achieved. Waiting several years for completion of cleanup at the Site would not meet the planned redevelopment schedule established to bring jobs and workforce housing to the neighborhood in a timely manner. Based on the high mercury concentrations present on the Site, we believe that phytoremediation would take at least 3 years to complete and would take longer (5-10 years).

2) Contaminant Mobilization May Be Increased. The underlying biological and chemical processes that plants use to uptake contaminants from the soil may change the chemical form of the contaminant and make it more soluble and mobile. In other words, it is possible that these processes could cause unintended environmental exposure issues and increase environmental liability related to the underlying contaminants. This potential would have to be carefully studied through treatability studies and could delay the start of remediation.

3) Inorganic Contaminants Do Not Go Away. As discussed previously, inorganic contaminants (e.g., mercury) removed from the soil by the plant roots are stored in the stems and leaves of the plant. The mercury is still there, it is just present in a different form. It is very likely that the harvested plants and/or leaf litter with the mercury would still need special management and off-site disposal because of mercury content. It would not be practical to leave the harvested plants on-site and let them biodegrade (see Factor 2 above).

4) Additional Uncertainties. The high concentrations of mercury in the former greens at the site may inhibit plant growth and limit the ability for uptake by plants. Phytoremediation of mercury has primarily been used on a bench scale study with concentrations much lower than what is present at the Site. Field level studies of Phytoremediation of Mercury effectiveness are very limited compared to sites that have been implemented for phytoremediation of lead.

b.1 Effectiveness

- **Alternative #3: Contaminated Soil Excavation with Off-Site Disposal**
  Excavation with off-site disposal is a proven and effective approach to soil cleanup/remediation that is approvable from a regulatory perspective. With this alternative, the known soil contamination would be fully removed from the Hillcrest Site, resulting in the elimination of human health and environmental risks related to the soil contamination. Implementation of this alternative would include excavation and off-site disposal of an estimated 40,000 cubic yards of contaminated soil exceeding established site cleanup standards identified at former golf course tee areas, fairways, greens and the other areas of the Hillcrest Site (i.e., fertilizer/pesticide storage and use areas, contaminated soil berms with intermixed debris, and wetlands). The off-site soil disposal would be completed at a permitted landfill. A restrictive covenant or other institutional controls would not likely be required for this alternative. Although this alternative meets

the SPPA's overall project goal, it is the highest cost alternative being considered and has a high implementation negative impact on the environment because of the extensive use of fossil fuels to transport all contaminated soil to off-site disposal facilities.

- **Alternative #4: Contaminated Soil Excavation with a Combination of On-Site Soil Management and Off-Site Disposal**
  Alternative #3 is also a proven and effective approach to soil cleanup/remediation that is approvable from a regulatory perspective. With this alternative, the known areas of contaminated soil would also be fully excavated and soils with the highest concentration of contamination would be transported off-site for disposal at a permitted landfill, like Alternative #3. The remainder of the excavated contaminated soils would be managed on site by placing and compacting the impacted soil at designated locations and depths at the Hillcrest Site. The designated locations would be pre-approved by the regulatory agencies for safe management and compatible with future development plans and site uses. Alternative #3 addresses the risk to public health and the environment because the locations of on-site soil management would be selected to ensure future users of the Hillcrest Site would not come in direct contact with the contaminated soil and contamination would not leach to groundwater. Implementation of this alternative would include excavation of an estimated 40,275 cubic yards of contaminated soil exceeding site cleanup standards (, off-site disposal of an estimated 35,275 cubic yards of contaminated soil at a permitted landfill, and on-site placement and compaction of remaining 5,000 cubic yards of contaminated soil at the Hillcrest Site. This alternative meets the SPPA's overall project goal and has the added benefit of potentially being the lower cost alternative (compared to Alternative #3). It is noted that Alternative #4 also has a slightly lower implementation negative impact (compared to Alternative #3) on the environment because less fossil fuels would be used to transport the contaminated soil off-site locations (i.e., lower carbon footprint).

b.2 Implementability

- **Alternative #3: Contaminated Soil Excavation with Offsite Disposal**
  This alternative is technically easy to implement. Materials, equipment, technologies, and service firms needed to implement Alternative #3 are readily available and easy to procure. Site accessibility for implementation would be coordinated with mass site grading and infrastructure development phase of the project. Required permits and regulatory approvals for this alternative would be obtained in advance after the formal City planning process is complete and depending on the development configuration and schedule.
- **Alternative #4: Contaminated Soil Excavation with a combination of On-Site Management and Off-Site Disposal**
  This alternative is also technically easy to implement. As with Alternative #3, materials, equipment, technologies and service firms required for implementation are readily available and easy to procure. Site accessibility for implementation would be coordinated with the mass site grading and infrastructure development phase of the project. Required permits and regulatory approvals for this alternative would be

obtained in advance after the formal City planning process is complete and depending on the development configuration and schedule.

b.3 Cost

- **Alternative #3: Contaminated Soil Excavation with Offsite Disposal**
  It is estimated that implementation of Alternative #3 at the Hillcrest Site would cost approximately **$4,000,000**. Costs for implementing this alternative could increase if heavy rainfall events occur during implementation, the likelihood of which may increase over time if existing climate change trends continue.
- **Alternative #4: Contaminated Soil Excavation with a Combination of On-Site Soil Management and Off-Site Disposal**
  It is estimated that implementation of Alternative #4 at the Hillcrest Site would cost approximately **$3,750,000**. Costs for this alternative could also increase if heavy rainfall events occur during remediation.

c. Recommended Cleanup Alternative

Alternative #4 (Contaminated Soil Excavation with a Combination of On-Site Management and Off-Site Disposal) is the recommended cleanup alternative for the Hillcrest Site. Alternative #4 met the SPPA's overall project goal of facilitating redevelopment and minimizing risks to human health and the environment and was the most cost-effective alternative. Alternative #4 was also determined to have a lower implementation negative impact on the environment compared to the other alternatives evaluated. It is noted that Alternative #4 will require specific regulatory approval for the selected on-site management locations and assumes that the final site grading plans for the Hillcrest Site will identify suitable on-site locations meeting established regulatory, geotechnical and future property owner requirements. If suitable on-site management locations cannot be found, then Alternative #3 (Contaminated Soil Excavation with Off-Site Disposal) will need to be implemented.

As stated previously, Alternative #1 (No Action) cannot be recommended since it does not adequately address environmental risks and is inconsistent with redevelopment. In addition, Alternative #2 (Phytoremediation) cannot be recommended since the implementation timeframe and lack of proven effectiveness is inconsistent with the planned redevelopment as well as the additional factors discussed in Section III.b above.

The following describes the general site activities that would be completed to implement the recommended alternative at the Hillcrest Site:

- Soil cleanup/remediation of the Hillcrest Site will be most efficiently implemented by coordination with the redevelopment mass grading effort for the property. Implementation during mass grading will require consideration of cut and fill areas, future development parcel property boundaries, future development uses identified for specific areas of the site, and site geotechnical requirements.
- Mercury-contaminated soil above the residential/recreational and commercial/industrial SRVs of 2.7 mg/kg (residential/recreational SRV) 3.1 mg/kg (commercial/industrial SRV)

will be excavated from the Hillcrest Site and staged in a secured stockpile located at the Hillcrest Site.

- It is expected that the highest levels of mercury contaminated soil from the former greens will require off-site disposal at a permitted landfill. The miscellaneous soil berms with intermixed debris/solid waste located south of the maintenance shop area will also require removal and disposal at a permitted landfill.
- The remaining contaminated soil at the site considered suitable for on-site management will be consolidated and managed at pre-approved locations at the Hillcrest Site consistent with the MPCA and MDA-approved response action plan (RAP). As stated previously, on-site management assumes that site grading plans will identify suitable locations meeting established regulatory, geotechnical and future property owner requirements. If suitable on-site management cannot be found, all excavated contaminated materials will require off-site disposal at a permitted landfill.
- Post excavation verification sampling and testing will be completed to demonstrate that the contaminant concentrations in the remaining soil do not exceed the relevant SRVs for future use.

In addition to the above, implementation of the recommended cleanup/remediation alternative should include sealing the two known remaining water wells and the three permanent monitoring wells located at the Hillcrest Site in accordance with Minnesota Department of Health (MDH) requirements.

d. Green and Sustainable Remediation Measures for Selected Alternative

To add green and sustainable remediation measures to the selected alternative, several techniques are planned. The most recent Best Management Practices (BMPs) issued under ASTM Standard E-2893: Standard Guide for Greener Cleanups will be used as a reference in this effort. The SPPA will require the cleanup contractor to follow an idle-reduction policy and use heavy equipment with advanced emissions controls operated on ultra-low sulfur diesel. The excavation work would be conducted during the dry-weather months (summertime) in order to minimize groundwater infiltration into the excavation area, in turn reducing dewatering needs and the amount of dewatering liquids requiring disposal/treatment. The number of mobilizations to the Hillcrest Site would be minimized and erosion control measures would be used to minimize runoff. In addition, the SPPA plans to ask bidding cleanup contractors to propose additional green remediation techniques in their response to the Request for Proposals for the cleanup contract.

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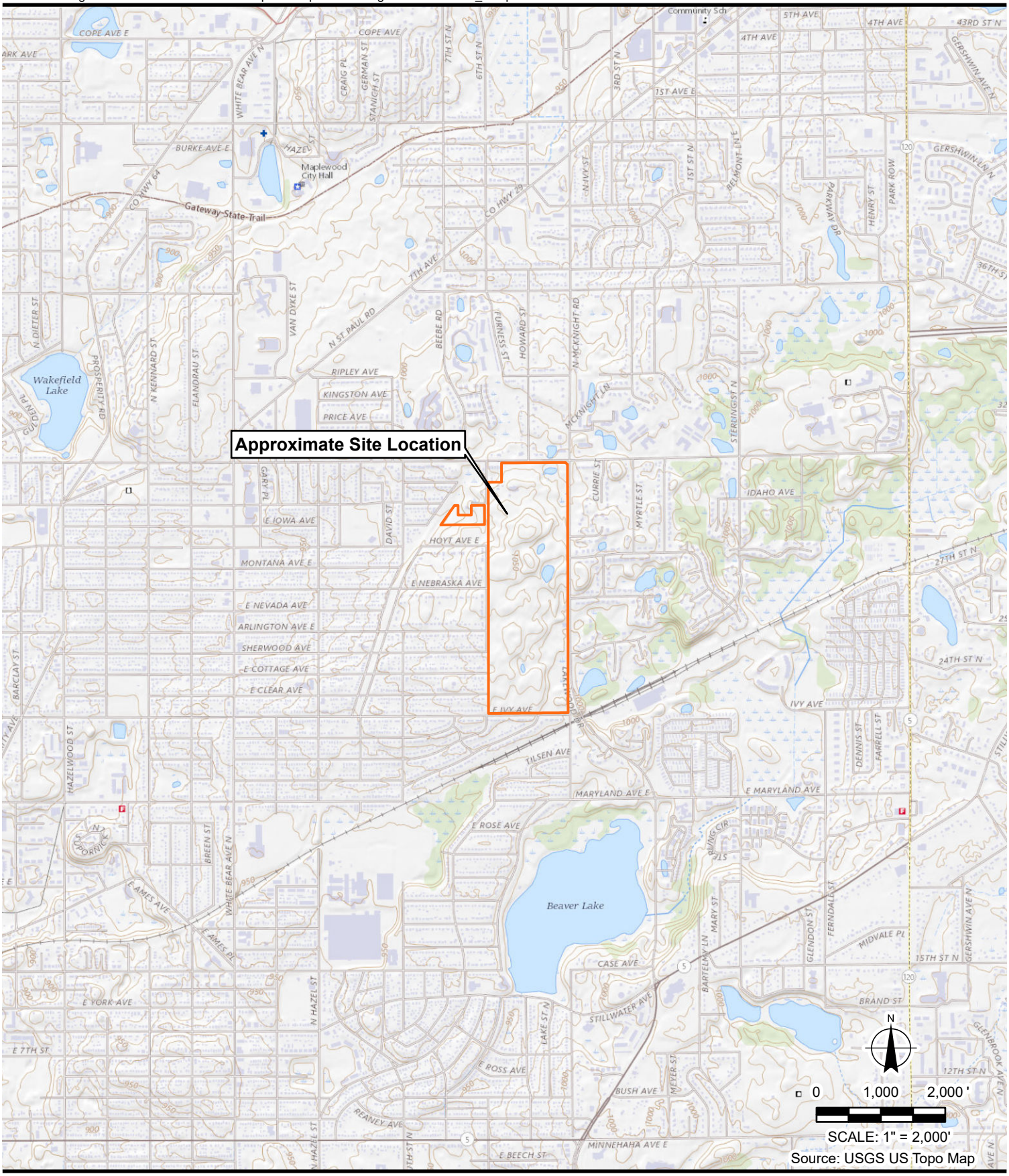

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Project No:	B1903316_00
Drawing No:	B1903316_00_Fig 1
Drawn By:	ZS
Date Drawn:	2/28/2022
Checked By:	MK
Last Modified:	6/28/2022

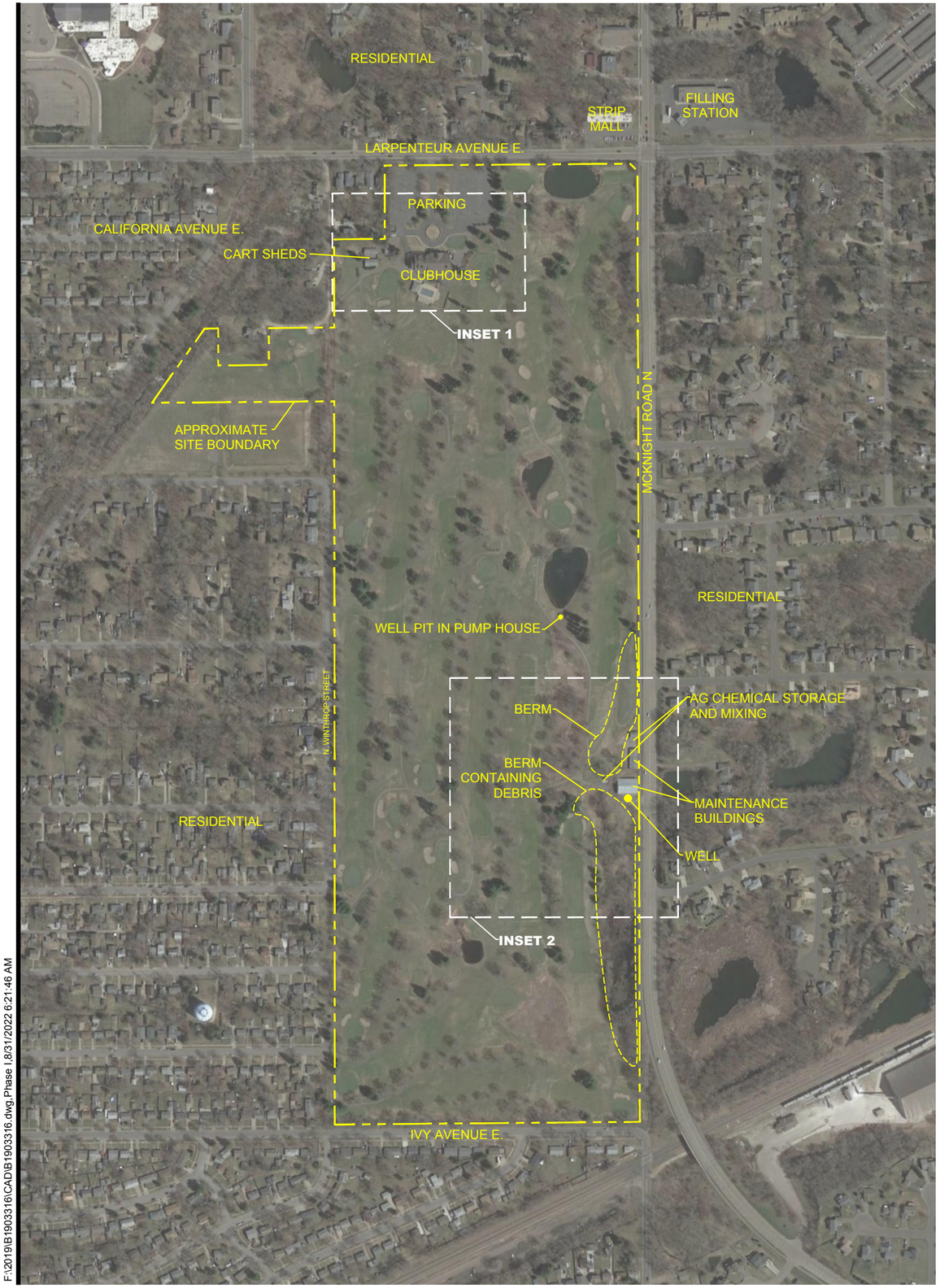
Hillcrest Redevelopment Site

McKnight Road N and Larpenteur Avenue E

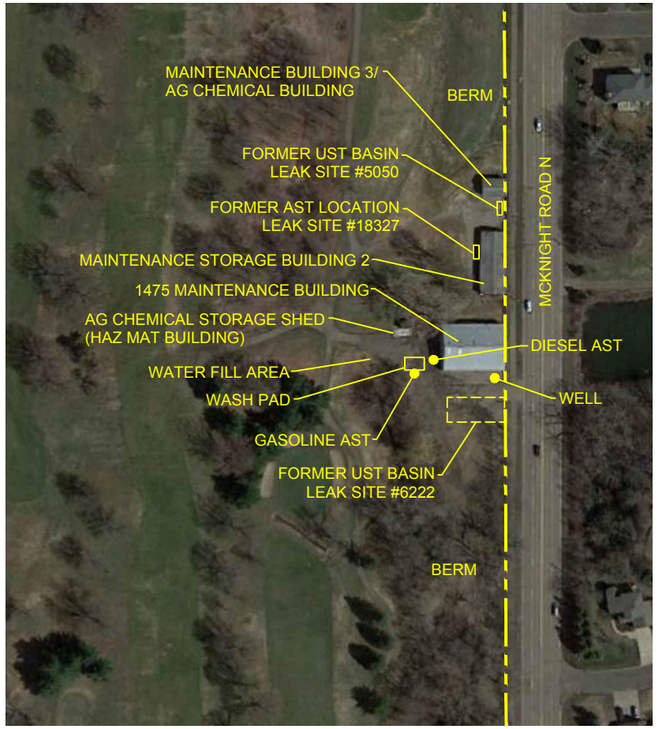
St. Paul, Minnesota

Site Location

Attachment 1



INSET 1: CLUBHOUSE AREA
SCALE: 1" = 120'



INSET 2: MAINTENANCE FACILITY
SCALE: 1" = 200'

250' 0 500'
SCALE: 1"= 500'

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Drawing Information

Project No:	B1903316.00
Drawing No:	B1903316
Drawn By:	LAO
Date Drawn:	5/15/19
Checked By:	MPE
Last Modified:	8/31/22

Project Information

Hillcrest Redevelopment Site

McKnight Road N and Larpenteur Avenue E

St. Paul, Minnesota

Site Diagram

Attaachment 2

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TYPE 2 SOIL EXCAVATION AREAS

- 0.5 FT. DEPTH

TYPE 3 SOIL EXCAVATION AREAS

- 0.5 to 1 FT. DEPTH
- 2 FT. DEPTH
- 3 FT. DEPTH
- 4 FT. DEPTH
- 5 FT. DEPTH
- 10 FT. DEPTH

SOIL EXCAVATION VOLUMES

TYPE 3 SOIL WITH MERCURY CONCENTRATION >10 MG/KG = 7,130 CUBIC YARDS

TYPE 3 SOIL WITH MERCURY CONCENTRATION <10 MG/KG = 20,165 CUBIC YARDS

TYPE 2 SOIL = 6,980 CUBIC YARDS

SOIL WITH INTERMIXED DEBRIS POOL AREA = 2,000 CUBIC YARDS

SOIL WITH INTERMIXED DEBRIS MAINTENANCE AREA = 4,000 CUBIC YARDS

N

75' 0 150'

SCALE: 1" = 150'

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Drawing Information

Project No: B1903316.00

Drawing No: B1903316-00G

Drawn By:	BJB
Date Drawn:	8/25/21
Checked By:	MK
Last Modified:	5/2/22

Project Information

Hillcrest Redevelopment Site

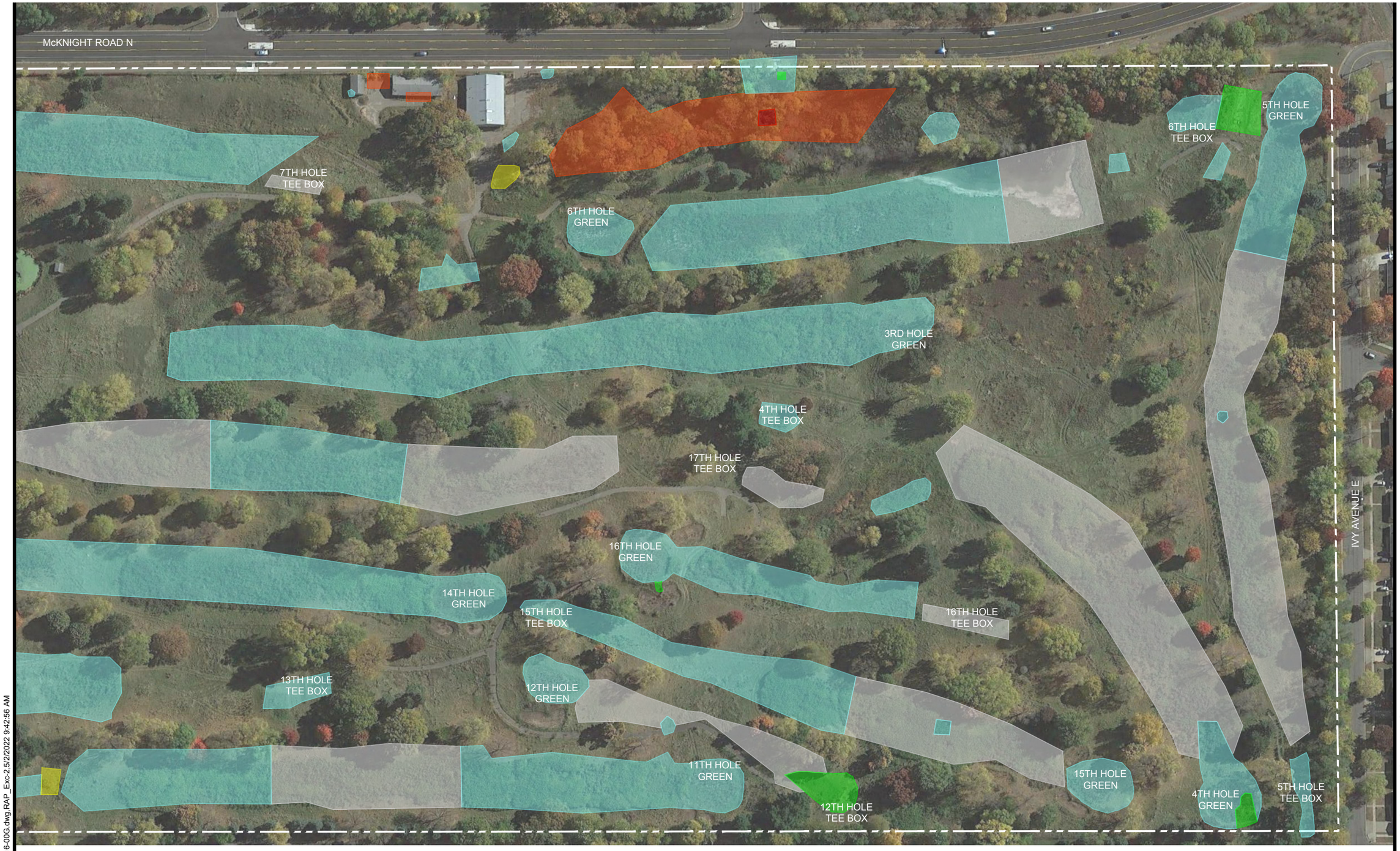
2200 Larpenteur Avenue E

Saint Paul, Minnesota

Contaminated Soil Locations

Sheet: 1 of 2

Attachment 3



TYPE 2 SOIL EXCAVATION AREAS

- 0.5 FT. DEPTH

TYPE 3 SOIL EXCAVATION AREAS

- 0.5 to 1 FT. DEPTH
- 2 FT. DEPTH
- 3 FT. DEPTH
- 4 FT. DEPTH
- 5 FT. DEPTH
- 10 FT. DEPTH

SOIL EXCAVATION VOLUMES

TYPE 3 SOIL WITH MERCURY CONCENTRATION >10 MG/KG = 7,130 CUBIC YARDS

TYPE 3 SOIL WITH MERCURY CONCENTRATION <10 MG/KG = 20,165 CUBIC YARDS

TYPE 2 SOIL = 6,980 CUBIC YARDS

SOIL WITH INTERMIXED DEBRIS POOL AREA = 2,000 CUBIC YARDS

SOIL WITH INTERMIXED DEBRIS MAINTENANCE AREA = 4,000 CUBIC YARDS

N

75' 0 150'

SCALE: 1" = 150'

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BRAUN INTERTEC
The Science You Build On.
11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
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Drawing Information

Project No:	B1903316.00
Drawing No:	B1903316-00G
Drawn By:	BJB
Date Drawn:	8/25/21
Checked By:	MK
Last Modified:	5/2/22

Project Information

Hillcrest Redevelopment Site

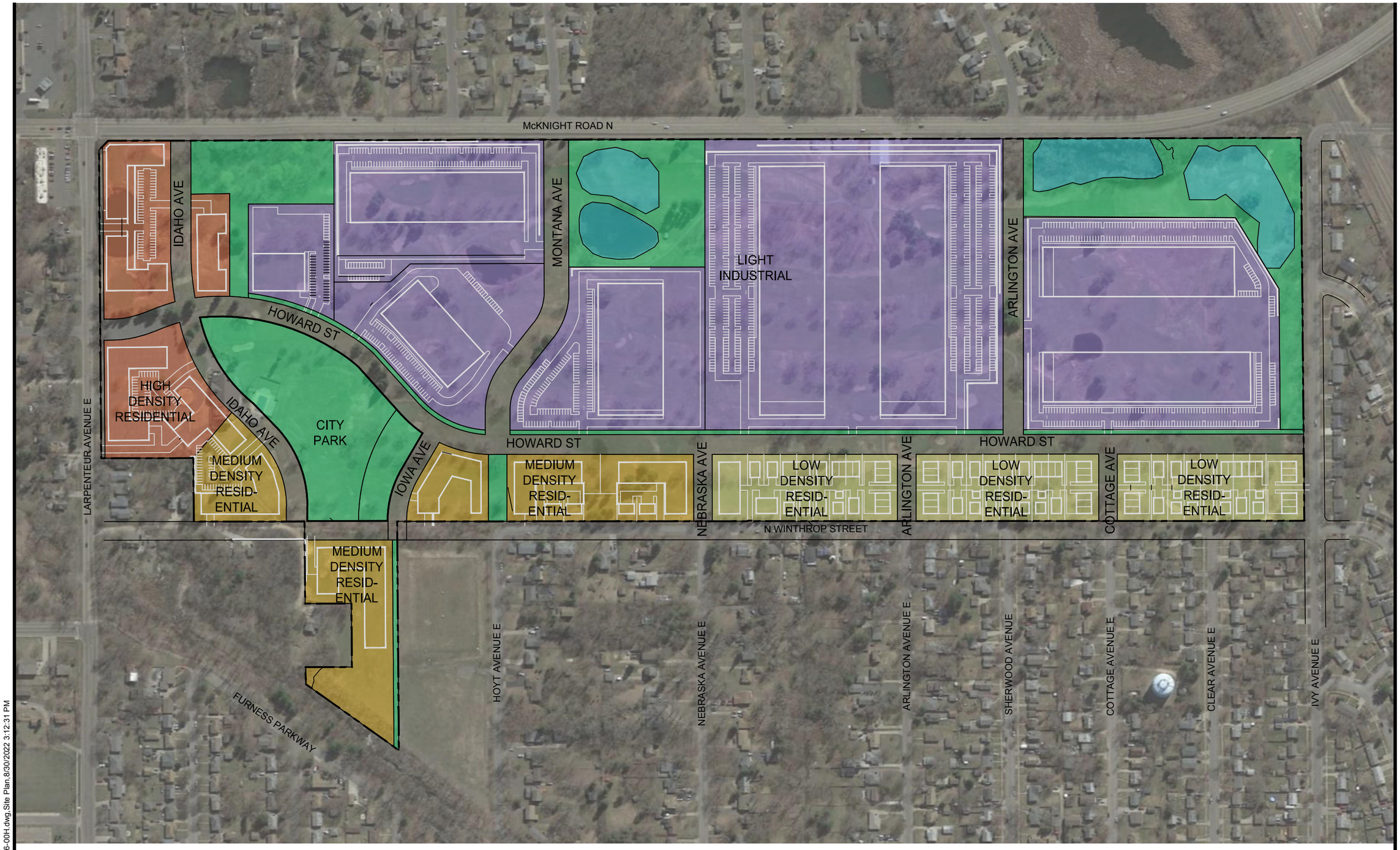
2200 Larpenteur Avenue E

Saint Paul, Minnesota

Contaminated Soil Locations

Sheet: 2 of 2

Attachment 3



150' 0 300'

SCALE: 1" = 300'

F:\2019\B1903316\CAD\B1903316-00H.dwg,Site Plan,8/30/2022 3:12:31 PM

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Drawing Information

Project No: B1903316.00

Drawing No: B1903316-00H

Drawn By:	BJB
Date Drawn:	5/23/19
Checked By:	MK
Last Modified:	8/30/22

Project Information

Hillcrest Redevelopment Site

2200 Larpenteur Avenue E

Saint Paul, Minnesota

Site Redevelopment Configuration

Attachment 4